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AN EXPLANATION FOR THE DISJUNCT DISTRIBUTIONS OF *MODULATRIX OROSTRUTHUS* AND *APALIS* (OR *ORTHOTOMUS*) *MOREAUI*

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Of the rare species of forest bird occurring in the Usambara Mountains, Tanzania, documented by Stuart & van der Willigen (1978), two are remarkable for their disjunct distributions. These are the Dappled Mountain Robin *Modulatrix orostruthus* and the Long-billed Apalis *Apalis moreaui*. An explanation for their extraordinary distributions is offered below.

MODULATRIX OROSTRUTHUS

This species is known from Namuli Mountain in northern Mozambique (Vincent 1933), and the East Usambara Mountains in northeastern Tanzania (Sclater & Moreau 1935). These two localities represent the northern and southern ends of a chain of isolated mountain blocks known for their similar avifaunas (termed the Tanganyika-Nyasa montane forest group by Moreau (1966)). It is reasonable to assume that *M. orostruthus* is a relic that once occurred in most of the intervening mountain forests. The species was initially considered to be a greenbul (*Phyllastrephus orostruthus*), and perhaps for this reason Hall & Moreau (1970) suggested that it had been overrun, and largely replaced, by the Olive Mountain Greenbul *Phyllastrephus placidus*. Virtually nothing is known of the habits of *M. orostruthus*, there being very few sightings of it in the field. Stomach samples show its food to be insects. It seems likely that it feeds on the ground, and this is supported by its relatively long tarsus (mean 27.2 mm ± 0.6 mm, standard error from a sample (n) of 7 birds). Stronger evidence comes from the very dirty rings found on retrapped birds (pers. obs.) which indicate ground-feeding. Also, *M. orostruthus* tends to be caught low down in mist nets, very rarely as high as 1 m off the ground. *Phyllastrephus placidus*, on the other hand, though living in the ground stratum, forages almost entirely in vegetation where it feeds on insects. It almost never alights on the ground, and it is doubted, therefore, that it competes in any way with *M. orostruthus*.

Benson & Irwin (1975) re-classified the bird as a robin in the genus *Modulatrix*. The only other member of this genus, the Spot-throat *M. stictigula*, would appear to be a more likely candidate for competition with *M. orostruthus*. This species is endemic to the Tanganyika-Nyasa montane forest group, occurring in virtually all the mountain forests from the Usambaras south to the Nyika Plateau in northern Malawi. It is, however, absent from Namuli Mountain, where *M. orostruthus* occurs. It is also very rare in the East Usambaras (the only other recorded locality for *M. orostruthus*). *Modulatrix stictigula* is abundant in most parts of its range, being confined to montane forest. However, the forests of the East Usambaras at only 900 m are not truly montane; indeed, they

were termed 'Intermediate Evergreen Forests' by Moreau (1935). It would appear that these forests are not very suitable for *M. stictigula*. *Modulatrix orostruthus* survives, therefore, in two localities: one where *M. stictigula* is absent and one where it is very rare. This suggests that *M. orostruthus* was once widespread in the forests of the Tanganyika-Nyasa highlands, but was later displaced by *M. stictigula*. If this is the case, *M. orostruthus* could be present in other parts of the Tanganyika-Nyasa highlands where *M. stictigula* is rare or absent. Such localities are probably very few, but the Intermediate Evergreen Forests on the eastern slopes of the Uluguru and Nguru Mountains in eastern Tanzania may be suitable (although Th. Andersen collected many birds at 1000 m in the Ulugurus, he did not take this species (P.L. Britton pers. comm.)). The close interlocking of the ranges of the two members of *Modulatrix* lends strong support to the reclassification of Benson & Irwin (1975).

There are also ecological reasons for suspecting *M. orostruthus* and *M. stictigula* to be in competition. *Modulatrix stictigula* is also insectivorous, foraging almost entirely on the ground. Both species are of similar size, weights being as follows:

M. orostruthus	31.2 g SE ± 1.4 g, n = 7
M. stictigula	30.3 g SE ± 2.0 g, n = 133

It may be objected that if *M. orostruthus* has been displaced by its congener, then there should be nothing to prevent it from occurring in some of the lowland forests of eastern East Africa, where *M. stictigula* is absent. In particular, why is it absent from the foothill forests of the East Usambaras, which are contiguous with the Amani forests? There is another possible competitor in these low altitude forests, the Pale-breasted Illadopsis *Trichastoma rufipennis*. This is common in the East Usambara foothill forests, but occurs in smaller numbers, where it is sympatric with either species of *Modulatrix* from 900 m at Amani up to at least 1200 m in the West Usambaras. It is only slightly smaller than the other two species (27.3 g ± 2.9 g, n = 23), is insectivorous, and feeds at least partially, if not mainly, on the ground. It may be that the presence of the genus *Modulatrix* in the Tanganyika-Nyasa highlands accounts, at least in part, for the very poor representation of the genus *Trichastoma* in this region.

The Orange Ground Thrush *Turdus gurneyi* is sometimes mentioned as a competitor with *M. stictigula*. It is considered most unlikely that it competes with either species of *Modulatrix* since it is about twice the size and feeds to a large extent on berries.

In conclusion, it appears possible that the disjunct distribution of *M. orostruthus* has arisen as a result of competition with *M. stictigula,* and, to a lesser extent, *Trichastoma rufipennis*. It seems unlikely that other species such as *Phyllastrephus placidus* and *Turdus gurneyi* could be competitors.

APALIS (or *ORTHOTOMUS*) *MOREAUI*

This species is known from the Njesi Plateau in northern Mozambique (Benson 1945), and from the East Usambara Mountains (Sclater 1931). As with the previous species, it seems likely that it once occurred in most of the forests of the Tanganyika-Nyasa highlands, but has now been largely displaced. *Apalis moreaui*, with its dull plumage and skulking habits, shows few characteristics of the genus *Apalis*. It therefore seems unlikely that it should have been overrun by another member of this genus. Even the Bar-throated Apalis *A. thoracica* usually occurs markedly higher above the ground. Hall & Moreau (1962) suggested that *A. moreaui* should be placed in the genus *Orthotomus*. There is a strong morphological and behavioural similarity between this species and the Red-capped Forest Warbler *Orthotomus metopias*. This latter species is endemic to the Tanganyika-Nyasa highlands, occurring on most of its mountain blocks,

though absent from Mt Rungwe and all of Malawi. It has not been recorded from the East Usambaras for over 40 years, its rarity here probably being due to the presence of *A. moreaui*. The two species are sympatric on the Njesi Plateau, and if the number of specimens that have been collected of each species (see Benson 1946) can be related to the birds' abundance, then perhaps they occur here in similar numbers. This indication could be pure chance, and one or the other might be declining to eventual local extinction (as seems to apply to *O. metopias* in the East Usambaras). Interestingly, Benson's collector reported that on the Njesi Plateau *A. moreaui* occurred in the canopy (Benson 1946). This seems surprising in view of the species' observed habits in the Usambaras, and as a result Benson wonders if a mistake was made (see Hall & Moreau 1970). However, it is possible that *A. moreaui* has avoided competition with *O. metopias* on the Njesi Plateau by becoming a canopy species, allowing both to occur in similar numbers.

The weights of the two species appear to be similar, as shown below:

A. moreaui	8.8 g, n = 1
O. metopias	8.4 g, ± 0.9 g, n = 27

Both species are insectivorous, taking their food in patches of thick vegetation, nearly always within 10 m of the ground. It therefore seems possible that *O. metopias* has largely displaced *A. moreaui* from most of its former range.

Fry (1976), in his review of the systematics of African and Asian tailorbirds, considered *A. moreaui* a strong candidate for inclusion in *Orthotomus*, on the basis of physical characteristics and song. On the same grounds, he sank *Camaroptera* into *Orthotomus*. In view of this it is interesting to note that *A. moreaui* in the Usambaras is restricted to a very narrow altitudinal range around 900 to 1000 m. Below this altitude it is completely replaced by the Grey-backed Camaroptera *Camaroptera brachyura* (while at higher altitudes it is replaced by *O. metopias*). All three species are familiar to the author in the Usambaras and it is confirmed that they occupy very similar niches, favouring very dense undergrowth, especially in forest clearings, and along the forest edge. It seems, from field observations, (and regardless of whether or not all three species should be considered congeners), very likely that both *C. brachyura* and *O. metopias* are competing with *A. moreaui* and restricting its range. *Camaroptera brachyura* is not listed for the Njesi Plateau and if it does occur it would be at its maximum altitude (Benson & Benson 1977). It is possible, therefore, that this species has also played a part in fragmenting the range of *A. moreaui*. It is only slightly larger, weighing around 10 g.

CONCLUSION

Modulatrix orostruthus and *Apalis moreaui* are among the rarest birds in Africa. This paper shows that they are probably rare for natural reasons. However, their future is now in the balance owing to forest destruction, at least in the Usambaras, and probably in northern Mozambique as well. As they are not endemic to East Africa they were not considered by Turner (1977); nevertheless, their world populations are likely to be far lower than those of several East African Endemics treated by Turner.

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